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the right of agnostics and atheists to use the public school as a forum for the teaching of their doctrines.

The Bible has in many places been excluded from the schools on the ground that religion should not be taught by those paid by public taxation. If this doctrine is sound, what right have the enemies of religion to teach irreligion in the public schools? If the Bible cannot be taught, why should Christian taxpayers permit the teaching of guesses that make the Bible a lie? A teacher might just as well write over the door of his room, "Leave Christianity behind you, all ye who enter here," as to ask his students to accept an hypothesis directly and irreconcilably antagonistic to the Bible.

Our opponents are not fair. When we find fault with the teaching of Darwin's unsupported hypothesis, they talk about Copernicus and Galileo and ask whether we shall exclude science and return to the dark ages. Their evasion is a confession of weakness. We do not ask for the exclusion of any scientific truth, but we do protest against an atheist teacher being allowed to blow his guesses in the face of the student. The Christians who want to teach religion in their schools furnish the money for denominational institutions. If atheists want to teach atheism, why do they not build their own schools and employ their own teachers? If a man really believes that he has brute blood in him, he can teach that to his children at home or he can send them to atheistic schools, where his children will not be in danger of losing their brute philosophy, but why should he be allowed to deal with other people's children as if they were little monkeys?

We stamp upon our coins "In God We Trust"; we administer to witnesses an oath in which God's name appears; our President takes his oath of office upon the Bible. Is it fanatical to suggest that public taxes should not be employed for the purpose of undermining the nation's God? When we defend the Mosaic account of man's creation and contend that man has no brute blood in him, but was made in God's image by separate act and placed on earth to carry out a divine decree, we are defending the God of the Jews as well as the God of the Gentiles; the God of the Catholics

as well as the God of the Protestants. We believe that faith in a Supreme Being is essential to civilization as well as to religion and that abandonment of God means ruin to the world and chaos to society.

Let these believers in "the tree man" come down out of the trees and meet the issue. Let them defend the teaching of agnosticism or atheism if they dare. If they deny that the natural tendency of Darwinism is to lead man to a denial of God, let them frankly point out the portions of the Bible which they regard as consistent with Darwinism, or evolution applied to man. They weaken faith in God, discourage prayer, raise doubt as to a future life, reduce Christ to the stature of a man, and make the Bible a "scrap of paper." As religion is the only basis of morals, it is time for Christians to protect religion from its most insidious enemy.

#### SCIENTIFIC BOOKS

*James Hall of Albany, Geologist and Palaeontologist, 1811-1898.* By JOHN M. CLARKE. Pp. 565, illustrated. Albany, 1921 (S. C. Bishop, \$3.70, net).

In this book we have a very informative and highly entertaining history, not only of Professor James Hall, but of most of the other pioneers in American geology and paleontology as well. It is replete with interest for all men of science.

Hall was an extraordinary man in many ways, turning out a prodigious amount of geologic work, and furnishing, by his dynamism, an inestimable "creative impulse to study and research." He was sensitive to a remarkable degree, irascible, and with a surpassing ambition. His nervous system always taut, he "played on a harp of a thousand strings." In consequence he appears to have been in trouble with most of his associates, and yet he was "a confiding man, forever trusting the plausible stranger, even while distrusting his most devoted friends." He lost much money in mining!

Hall's scientific career began in 1836 and for sixty-two years he dominated Paleozoic geology, and more especially paleontology, in

North America. Thirteen great quarto volumes and at least a five-foot shelf of works on paleontology are his enduring monuments.

The wonderful Fourth District of western New York was Hall's "patent" and in it he labored for five years unraveling its geology, "the most excellent piece of field work he ever did," in the course of which was established a large part of the New York System of geological formations. Then came the ever widening *Palæontology of New York*, the dominant note of Hall's long life. An insatiable collector, without ever knowingly having a duplicate fossil, he sold the worked-up collections only to buy and collect others with the money so obtained. Appropriations or none by New York or other states, he went on constantly garnering more material.

As one reads the book, the thought comes readily that New York State has been the mother of geologists—one almost comes to the belief that all American geologists between 1843 and 1890 came from the Empire State or got their training there. We also see the passing show of the master minds that developed the geology of the entire Mississippi Valley, since they were all for one reason or another worshippers at the Albanian shrine. "His influence guided official geologic movements in every state where they were inaugurated, and in many his hand took a helmsman's part." Hall's influence was also great in Canada between 1843 and 1869, since his relations with the director of the Geological Survey of Canada, Sir William Logan, "were openly harmonious."

Hall's zenith of scientific attainments came between 1857 and 1861. Some years before, he presented at the Montreal meeting of the American Association for the Advancement of Science his "most notable performance in philosophical geology," *The Geological History of the North American Continent*. In this essay, published in 1861, he set forth two essential propositions in regard to mountain making, and they are the fundamentals on which our modern conception of these structures depends. These are:

1. That ranges of folded mountains exist only where sediments have uniformly accumulated to

maximum thickness and that such maximum accumulation is possible only by corresponding depression of the sea bottom along the edges of continents delivering such sediments. . .

2. That folded mountains result from the crumpling of the upper layers only of these accumulated deposits, a consequence of the adjustment of the later sediments to a deepening but contracting depression.

When Hall was sixty years of age, he was "at the threshold of his greatest productive-ness," and he worked in this way:

Of all the corps of men engaged upon this work, Mr. Hall himself was, in these days, the most diligent. Nothing that entered into his publications escaped his criticism and review and he was keen and quick in the preparation of his manuscript. Up and at his desk soon after break of day, with a cup of tea and a panada at his elbow, he found his quiet hours before his assistants came around. And after they had gone there were the evening hours which seldom found him away from his work room. It was his habit when at work to sit before his desk on a revolving piano-stool; his backbone needed no support and an easy chair he abhorred. But alongside his desk he kept, for his callers, a deep scoop-shaped great chair into which the visitor shriveled as he sank down into insignificance near the floor, while his vis-à-vis, erect on his stool, towered majestically over him. It was a strategic advantage and in many an engagement commanded the enemy's works.

When the reviewer went to Albany in 1889 as Hall's private assistant, the latter was a picturesque old man:

His round, full-bodied figure, his heavy snowy beard running well up over his ruddy cheeks, an always erect carriage and a square level look out from under thick brows and over his Moorish nose; dressed in an old coat and in trousers which buttoned down the sides after the fashion of 1830, he was bound to attract attention and curiosity. Every morning . . . his man Tom drove him from his home in a broken-down, one-seated cart which had once owned a top but lost it long since, drawn by a broken-down old nag which had also seen better days and had like as not been taken in exchange for apples or old specimen boxes, his capacious snow-crowned figure capped with a chimney-pot hat towering above his diminutive driver—the jogging figure through the Albany streets was sure to compel notice.

Extolled by LeConte as the "founder of American geology," and by McGee as the "founder of American stratigraphy," said by Dana to be the man without whom "the geological history of the North American continent could not have been written," Hall's present biographer concludes that he "was in truth the apostle of historical geology." Much praise is due Dr. Clarke for the lively way in which he sets Hall—and many of his contemporaries—before us in these pages. The task was a great one, attended with peculiar difficulties, and its accomplishment reflects high credit upon the author. The paleontologic sun rose in New York in 1836, and its warmth still radiates from the Empire State throughout the North American continent!

CHARLES SCHUCHERT

## SPECIAL ARTICLES

### THE SYNTHESIS OF FULL COLORATION IN PHLOX

In the issue of *Genetics* for March, 1920, the writer published facts bearing on the color of the flower blade in *Phlox Drummondii*. Certain  $F_1$  purples that were full-colored and self-colored appeared as the progeny of two plants whose blades were a clear white. These  $F_1$  purples, when self-pollinated, gave rise to an  $F_2$  group comprising several types of corolla. A bluing factor in heterozygous condition in the  $F_1$  individuals doubled the number of  $F_2$  colored sorts. Ignoring the differences caused by this factor there were in the  $F_2$  group the following general types (illustrated in colors in Plate 1 in *Genetics*, Vol. 5):

1. Showy full-colored purple or rose type resembling the  $F_1$ . The color is evenly suffused over the blade, *i. e.*, the blade is self-colored.
2. A lighter type whose color is bright pinkish or light purplish. This kind also has its color uniformly suffused over the blade.
3. Dusky type whose dull magenta color is merely stippled on to the blade giving the flower the appearance of a dusty or dirty-looking white.
4. Pure white-bladed type.

Proceeding to the  $F_3$  generation it was found that the lighter uniformly colored Type 2 never gave rise to duskies (Type 3) on inbreeding, nor did the duskies ever contain plants of Type 2 among their offspring. Moreover, neither of these two types, on self-pollination, ever produced Type 1. The deep-colored  $F_2$  plants of Type 1 were capable of throwing out Types 2 and 3 besides repeating themselves. Such analysis led to the hypothesis that full or deep coloration in *Phlox* must be due to the presence together of the second and third types, or rather to the genes for these two types, which are not allelomorphic.

During the past year this hypothesis was tested out by the actual putting together, through hybridization, of Types 2 and 3. In all, seven matings of Types 2 and 3 were made yielding 59 offspring and from every crossing the progeny were both full-colored and self-colored.

Type 2 + Type 3 = Type 1.

This synthesis supplements and confirms the author's earlier work on the genetic relationship of color types in *Phlox Drummondii*.

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## THE PROPOSED FEDERATION OF BIOLOGICAL SOCIETIES

A CONFERENCE of officers of a number of biological societies was held in Toronto on December 27, 1921, to discuss the feasibility of closer cooperation among these societies. This conference was the outgrowth of two somewhat informal meetings in Chicago, the first in December, 1920, upon the initiative of the secretary of the American Society of Naturalists, the second in April, 1921, at the instance of the officers of the American Society of Zoologists and of the Botanical Society of America. At the request of those in attendance at the second conference the call for the Toronto meeting was issued by the Division of Biology and Agriculture of the National Research Council. The discussion of the Toronto conference was in a measure directed in accordance with a program arranged by the chairman of the Division